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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/864,376 | 05/25/2001 | Tadahiro Ohmi | 107176-00007 | 1605 |
| 7590 | 03/11/2005 | | | EXAMINER |
| ARENT FOX KINTNER PLOTKIN & KAHN PLLC 1050 Connecticut Avenue, N.W. Suite 400 Washington, DC 20036-5339 | | | ZERVIGON, RUDY | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1763 | |

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/864,376 | OHMI ET AL. |
| | Examiner | Art Unit |
| | Rudy Zervigon | 1763 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 16 February 2005.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-9, 12-14 and 16-26 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-9, 12-14 and 16-26 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) Notice of Informal Patent Application (PTO-152)
 6) Other: _____.

DETAILED ACTION

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action, as expressed in the personal interview of February 16, 2005, is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-5, 7, 8, 9, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) in view of Otsubo et al (USPat. 4,985,109). Tokuda teaches a plasma processing apparatus (Figure 13) including:

- i. A processing chamber (6, Figure 13; column 13, line 16 - column 14, line 5)
- ii. A microwave slot antenna (34, Figure 13; column 13, line 16 - column 14, line 5)
radiating antenna / radiating surface (lower surface of 34, Figure 13)
- iii. A plate-shaped dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5)
- iv. A distance "D" (" t ", Figure 13; column 11; lines 11-25) between the microwave radiating antenna surface (lower surface of 34, Figure 13) and a surface (upper surface of 5; Figure 13) of the dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5)
is shown by Tokuda et al in Figure 2
- v. Tokuda et al teaches a dielectric plate as discussed above

- vi. Tokuda further teaches the plasma (column 3; lines 58-67) is formed between the plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5) and the object (8; Figure 13) to be processed – claim 1
- vii. Tokuda further teaches forming a standing wave microwave (column 14; lines 30-45) between Tokuda's microwave radiating surface (lower surface of 34, Figure 13) and his plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5).
- viii. Tokuda further teaches relative spacing ("t", Figure 13; column 11; lines 11-25) between Tokuda's plate-shaped dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5) and Tokuda's plasma radiating surface (lower surface of 34, Figure 13).

Tokuda does not teach a specific thickness "d2" (Applicant's Figure 1) for his dielectric plate. Tokuda does not teach a slot antenna where a part of the number of slots is closed.

Otsubo teaches a concentric slot antenna (Figure 2) in a microwave plasma reactor (Figure 1) having a number of slots (5a) formed and distributed in the microwave radiating surface where a part of the number of slots can be closed (column 7, lines 3-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Tokuda to optimize the relative positions of Tokuda's dielectric plate (5, Figure 13; column 13, line 16 - column 14, line 5) with Tokuda's microwave slot antenna (34, Figure 13; column

13, line 16 - column 14, line 5), inclusive, to replace Tokuda's microwave slot antenna with Otsubo's slot antenna.

Motivation Tokuda to optimize the relative positions of Tokuda's dielectric plate (5, Figure 13; column 13, line 16 - column 14, line 5) with Tokuda's microwave slot antenna (34, Figure 13; column 13, line 16 - column 14, line 5), inclusive, to replace Tokuda's microwave slot antenna with Otsubo's slot antenna is for optimizing the space "between the slot antenna and the quartz window 4 through which the microwaves pass so that the microwaves emitted from the slot antenna have room to expand" (column 9, lines 6-30) as taught by Otsubo, further, motivation for Tokuda to use Otsubo's slot antenna under standing wave microwave propagation is for "easy" plasma generation as taught by Otsubo (column 19, lines 35-40). Further, it is well established that the rearrangement of parts is considered obvious to those of ordinary skill (In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950); In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984); MPEP 2144.04)

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) and Otsubo et al (USPat. 4,985,109) in view of Tsuchihashi, Masaaki et al (USPat. 6,109,208). Tokuda and Otsubo are discussed above. Tokuda and Otsubo do not teach plural slots of the microwave radiating antenna where the plural slots in the peripheral direction are closed. Tsuchihashi teaches a similar microwave plasma generating device (Figure 20, 21; column 11, lines 37-49) including plural slots ("slits" 6a-d, 10a-d) in the peripheral direction of the shutter antenna (26) where portions of the slots ("slits" 6a-d) in the peripheral direction can be opened ("A" direction; Figure 20) or closed (counter to "A" direction; Figure 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna as taught by Tsuchihashi.

Motivation to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna as taught by Tsuchihashi is for distributing microwaves as taught by Tsuchihashi to form high density plasmas (column 11, lines 37-49).

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) and Otsubo et al (USPat. 4,985,109) in view of Tsuchihashi, Masaaki et al (USPat. 6,109,208). Tokuda and Otsubo are discussed above. Tokuda and Otsubo do not teach plural slots of the microwave radiating antenna where the plural slots in the peripheral direction are closed.

Tsuchihashi teaches a similar microwave plasma generating device (Figure 20, 21; column 11, lines 37-49) including plural slots ("slits" 6a-d, 10a-d) in the peripheral direction of the shutter antenna (26) where portions of the slots ("slits" 6a-d) in the peripheral direction can be opened ("A" direction; Figure 20) or closed (counter to "A" direction; Figure 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi.

Motivation to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna where portions of the slots in the peripheral direction can be opened or closed as

taught by Tsuchihashi is for distributing microwaves as taught by Tsuchihashi (column 11, lines 37-49).

6. Claims 16-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) in view of Otsubo et al (USPat. 4,985,109). Tokuda is discussed above. Tokuda further teaches a plasma processing apparatus (Figure 13) including a microwave (34, Figure 13; column 13, line 16 - column 14, line 5) radial line (Figure 15) slot radiating antenna / radiating surface (lower surface of 34, Figure 13)

Tokuda does not teach a specific thickness "D" ("t", Figure 13; column 11; lines 11-25) for his dielectric plate. Tokuda does not teach a slot antenna where a part of the number of slots is closed.

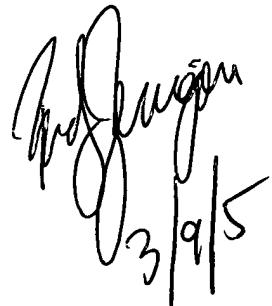
Otsubo teaches a slot antenna (Figure 2) in a microwave plasma reactor (Figure 1) having a number of slots (5a) formed and distributed in the microwave radiating surface where a part of the number of slots can be closed (column 7, lines 3-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Tokuda to optimize the thickness of the dielectric plate, and for Tokuda to use Otsubo's slot antenna, with Tokuda's radial line slot configuration.

Motivation for Tokuda to optimize the thickness of the dielectric plate, and for Tokuda to use Otsubo's slot antenna, with Tokuda's radial line slot configuration is for "easy" plasma generation as taught by Otsubo (column 19, lines 35-40) and circular TE₁ microwave generation for uniform and high density plasmas as taught by Tokuda (column 9, lines 7-30).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.


3/9/15